"If they believe, then so shall I": Perceived beliefs of the in-group predict conspiracy theory belief

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Abstract

Conspiracy beliefs are widespread and can have detrimental consequences. As perceived social norms can exert a powerful influence on individuals, we investigated the relationship between perceived norms of conspiracy beliefs and personal endorsement and whether conspiracy belief amongst others is overestimated. In Study 1, UK university students (n = 111) completed measures of their personal conspiracy beliefs and estimations of others' beliefs (an in-group and out-group they chose, and a prescribed in-group). The perceived belief of the in-groups strongly predicted personal conspiracy belief; the out-group did not. Study 2 and 3 replicated these findings in a British community sample (n = 177) and a UK parent sample (n = 197) focusing on anti-vaccine conspiracy theories. All studies demonstrated that people overestimate the conspiracy beliefs of others. This is the first demonstration of the association between perceived social norms of in-group conspiracy belief and individuals' personal conspiracy beliefs. Interventions challenging misperceived norms could be effective in reducing conspiracy beliefs.

Keywords

Conspiracy theories; social norms; social identification; misperceptions

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1. Introduction

Conspiracy theories can be defined as explanations for important events that involve secret plots from powerful malevolent groups (Douglas et al., 2019). Commonly endorsed conspiracy theories argue that climate change is a hoax (Jolley & Douglas, 2014a; Lewandowsky, Oberauer, & Gignac, 2013), the moon landings were faked by NASA (Lewandowsky et al., 2013) and that vaccinations are harmful, but this fact is covered up to maintain profits (Jolley & Douglas, 2014b). Although by definition conspiracy theories are alternative explanations, they are widespread (Oliver & Wood, 2014) and research suggests that belief in one conspiracy theory is strongly related to believing in several others (Goerztel, 1994; Wood, Douglas, & Sutton, 2012). British polls have found that one in four believe that the threat of climate change is exaggerated, one in six believe that the moon landings were staged, and one in five believe that vaccines have harmful effects which are being kept secret (YouGov, 2019). The current paper investigates a potential new antecedent to conspiracy belief - the perceived belief of others we identify with – where across three different contexts, we examine the relationship between perceived norms of conspiracy belief and actual beliefs.

1.1 The Psychology of Conspiracy Theories

There is a growing body of research demonstrating that belief in conspiracy theories can lead to harmful consequences (see Jolley, Mari & Douglas, 2020). In the health domain, endorsement of conspiracy beliefs about birth control (e.g., the belief that birth control is primarily to reduce Black populations) has been found to

predict negative attitudes towards contraceptives (Thorburn & Bogart, 2005). Belief in conspiracy theories also reduces intentions to vaccinate children against common childhood diseases (Jolley & Douglas, 2014b). In the social domain, exposure to conspiracy theories regarding climate change reduces pro-environmental intentions and political engagement (Jolley & Douglas, 2014a). Jolley, Meleady and Douglas (2019), have illustrated how exposure to intergroup conspiracy theories amplifies prejudice towards the target group (i.e., immigrants, Jewish people). Endorsing conspiracy theories can have detrimental consequences across a range of behaviours.

Given that millions of people subscribe to these potentially harmful viewpoints (Sunstein & Vermeule, 2009), there needs to be a better understanding of the psychological mechanisms underlying why people believe in conspiracy theories. Research to date has suggested that personality traits such as narcissism (Cichocka, Marchlewska & Golec de Zavala, 2016), Machiavellianism (Douglas & Sutton, 2011; March & Springer, 2019), and subclinical paranoid and schizotypal personality traits (Barron, Furnham, Weis, Morgan, Towell & Swami, 2018; Darwin, Neave, & Holmes, 2011; March & Springer, 2019), are related to conspiracy beliefs. Other psychological factors have also been shown to predict belief in conspiracy theories, such as distrust in authority, higher political cynicism, lower self-esteem, Need for Uniqueness and heightened stress (Abalakina-Paap, Stephan, Craig, & Gregory, 1999; Imhoff & Lamberty, 2017; Lantian, Mullerm, Nurra & Douglas, 2017; Swami et al., 2016). The current research aims to contribute to the literature by identifying a potential new antecedent to conspiracy belief, perceived social norms regarding belief, and suggests potential new avenues to address the dangers of heightened conspiracy belief.

1.2 Social Norms

Social influence refers to how our beliefs and behaviours are determined by perceptions of what other people think and do (Cialdini & Trost, 1998). A major component of social influence is social norms. Sherif (1936) describes social norms as jointly negotiated rules for social behaviour. Social norms guide one's behaviour by implicitly outlining what is acceptable and what is not in particular contexts (Cialdini & Trost, 1998). Social norms are often subcategorised into descriptive and injunctive norms. Descriptive norms refer to the perceived prevalence of an attitude or behaviour (i.e., ''what others do''), and injunctive norms refer to the perceived attitudes toward the behaviour (i.e., ''what others approve or disapprove of'') (Cialdini, Reno & Kallgren, 1990). Perceived social norms are a major determinant of attitudes and behaviour across diverse domains, for example; substance use (LaBrie, Hummer, Neighbors, & Pedersen, 2008; Neighbors, Larimer, & Lewis, 2004; Walters, Bennett, & Noto, 2000), gambling (Larimer & Neighbors, 2003), infection control (Dickie, Rasmussen, Cain, Williams, & MacKay, 2018), and green behaviours (Anderson et al., 2017). The current study focuses on descriptive norms of conspiracy belief, as these are used most often in the first instance of exploring the link between perceived norms and personal attitudes and behaviours (Dempsey, McAlaney & Bewick, 2018).

The theoretical basis for the exploration of the association between perceived social norms of conspiracy beliefs and personal beliefs is rooted in Social Identity Theory (SIT) (Tajfel & Turner, 1979). SIT states that individuals look to other members of the group to guide their attitudes and behaviour; meaning, people's attitudes and behaviour are systematically influenced by the norms of groups to

which they belong (Tajfel & Turner, 1979; Turner, 1982; 1991). People who more strongly identify with the group are more likely to act in accordance with the group norms (Terry & Hogg, 1996). For example, Neighbors et al. (2010) studied college student drinking norms and demonstrated that higher identification with other students was associated with stronger relationships between perceived student drinking norms and personal drinking. Thus, perceived norms of conspiracy belief may influence personal belief in conspiracy theories, particularly if we perceive groups who we strongly identify with endorse conspiracy theories (Terry & Hogg, 1996).

1.3 Social Norms and Conspiracy Belief

In accordance with this train of thought, core aspects of SIT have been demonstrated to influence belief in specific conspiracy theories. Research shows that in the context of situational threats, individuals who highly identify with an in-group are motivated to endorse conspiracy theories against the out-group. For example, Mashuri and Zaduqisti (2013) and Chayinska and Minescu (2018) found that in the context of intergroup conflict, strong identification with the in-group (Muslims and Euromaiden supporters respectively) increased endorsement of conspiracy theories related to the out-group. Further, research has robustly demonstrated that acceptance of conspiracy theories in intergroup contexts is associated with a defensive identification with in-group (Cichocka, Golec de Zavala, Marchlewska & Olechowski, 2015; Cichocka, Marchlewska, Golec de Zavala, & Olechowski, 2015; Marchlewska, Cichocka, Łozowski, Górska, & Winiewski, 2019). Specifically, collective narcissism, a form of defensive in-group positivity, reflecting a belief in the in-group's greatness which is unfairly unappreciated by others, predicts

belief in out-group conspiracies (Cichocka et al., 2015). SIT states that to maintain a positive social identity, one seeks to distinguish the in-group from the out-group in such a way that favours the in-group (Reicher, Spears & Haslam, 2010). Thus, stronger identification with the in-group influences motivation to endorse conspiracy theories against the out-group, particularly when the positive image of the in-group is threatened.

Douglas and Sutton (2008) demonstrated that exposure to conspiracy theories increases belief in them, which has been the foundation of subsequent research (e.g., Jolley & Douglas, 2014a, 2014b; Swami et al., 2011). Group memberships can influence the types of conspiracy theories individuals are exposed to. For example, in the US, members of different political parties can recognise which parties have 'ownership' of different conspiracy theories (Smallpage, Enders, & Uscinski, 2017). Both Republicans and Democrats agreed that conspiracy theories regarding Obama's birthplace were more likely to be promoted by Republicans than by Democrats (Smallpage et al., 2017). This could increase the individual's belief in these conspiracy theories as well as their perception that other group members also endorse them, leading to misperceptions of how widespread conspiracy theories are. Specifically, if individuals perceive that the groups they identify with endorse conspiracy theories, and thus normative influence is maximised, this could drive personal endorsement of conspiracy theories.

1.4 The Current Research

The current studies aim to investigate the association between perceived norms of in-group conspiracy belief and personal conspiracy endorsement of a range of issues (such as climate change, the moon landings and the existence of aliens), and whether people over-estimate the belief of others in these conspiracy theories.

Studies 1 and 2 examine the relationship between participants' predictions of the belief of three social groups in conspiracy theories (i) an in-group chosen by participants; (ii) an out-group chosen by participants; and (iii) a prescribed in-group, 'typical students' (Study 1) and 'other British citizens' (Study 2) and their personal belief in the same conspiracy theories. The in-group chosen by the participant represents a proximal group, as research has shown that proximal groups exert more influence on individual beliefs and behaviour (e.g. Neighbors et al., 2010), whereas the prescribed in-groups represent broader in-groups. It is hypothesised that the perceived norms regarding conspiracy belief of both the in-group chosen by participants and the prescribed in-group will positively predict personal belief in conspiracy theories. However, the perceived norms of the out-group regarding conspiracy belief will not. It is also hypothesised that participants will over-estimate the extent to which other students at the same university (Study 1) and other British citizens (Study 2) endorse conspiracy theories.

Study 3 then focusses on a specific conspiracy theory (anti-vaccine conspiracy theories) with a specific in-group (parents). Although vaccines are the most effective way to prevent infectious diseases (NHS, 2019), their safety and efficacy have long been embroiled in conspiracy theories, centring on the arguments that big pharma companies and/or governments cover-up information about vaccines for their own personal gains (Jolley & Douglas, 2014b; Kata, 2010). Belief in anti-vaccine conspiracy theories has been shown to reduce vaccination intentions (Hornsey, Harris & Fielding, 2018; Jolley & Douglas, 2014b). As the uptake of childhood vaccines is decreasing in many countries (e.g. in the UK) (WHO, 2019; NHS, 2019), it is particularly important to investigate the antecedents of anti-vaccine conspiracy beliefs. It is hypothesised that (i) the perceived beliefs of two different in-

groups, other parents and other British citizens, in anti-vaccine conspiracy theories will positively predict personal belief in them and (ii) that parents will over-estimate the level of belief in anti-vaccine conspiracy theories of other UK parents.

Need for Uniqueness and identification with each of the social groups was also measured in each study. Previous research has shown that conspiracy theories are attractive as they can bolster one's need to feel unique (Imhoff & Lamberty, 2017; Lantian et al., 2017), and those who are high in uniqueness are less likely to be influenced by perceived social norms (Imhoff & Erb, 2009). Thus, it was hypothesised that the relationship between perceived norms of conspiracy belief and actual norms will be moderated by i) Need for Uniqueness, such that, the stronger participants need to feel unique, the less influence the perceived norms would have on actual conspiracy belief, and ii) level of social identification with the group, such that the stronger participants identify with a group, the stronger the association between perceived norms of conspiracy belief and actual beliefs. All materials for Study 1 can be found here: https://osf.io/2p9ez/, materials and data for Study 2 can be found here: https://osf.io/4786a/ and materials and data for Study 3 can be viewed here: https://osf.io/9q5kt/.

2. Study 1

2.1 Method

2.1.1 Participants and Design

As no previous studies had assessed the relationship between perceived norms of conspiracy belief and actual norms, there were no clear expectations of

effect size. Power analysis using GPower showed that to detect a medium effect using Cohen's f^2 (f^2 = .15), a sample of n = 115 participants would be required for 85% power for regression analysis (linear multiple regression: fixed model, R^2 deviation from 0) with seven predictor variables. One hundred and eighty-one students studying at a UK university were recruited to take part in the study in return for course credit. The questionnaire included attention check items (e.g. 'Check 4 for this statement'); participants who failed an attention check (*n* = 48), and participants who failed to enter a sensical in-group and out-group (*n* = 22), were removed (total *n* = 70). The remaining participants (*N* = 111; 97 females, 14 males, *M* = 23.32 years, *SD* = 7.81) were included in the analysis.

The study employed a cross-sectional design, where the outcome variable was the participant's belief in conspiracy theories. The predictor variables were the perceived conspiracy beliefs of an in-group (chosen by participants), an out-group (also chosen by participants) and 'typical (name of university) students'. Participants' Need for Uniqueness and social identification with each of the groups were measured as moderator variables[2]. Demographic variables, sex and age, were also measured.

2.1.2 Materials and Procedure

Ethical approval was first gained from the relevant university ethics panel. The study was hosted by Qualtrics, an online software tool used to build questionnaires. Once the study was accessed, participants were first presented with an information

[2] In both studies 1 and 2 general conspiratorial mindset of participants was also measured using the Generic Conspiracist Beliefs Scale (Brotherton, French & Pickering, 2013). This was initially considered as a potential moderator variable, however, this is highly correlated with the Belief in Real-World Conspiracy Theory Scale (Study 1 = .66**) and (Study 2 = .71**), this variable was not analysed any further.

page, followed by a consent form. First participants were asked to complete some demographic questions, and then they were asked to state an in-group of their choice; *'We are often part of many different groups, some of these we feel close to and identify with, and some of these we may not feel as close to, or may not identify with. Please indicate below a group who you feel close to and strongly identify with...'.* Participants were then asked to state an out-group; '*Please indicate below a group who you do not feel close to and do not identify with...'.*

Personal belief in conspiracies was measured using the Belief in Real-World Conspiracy Theories Scale adapted from Douglas and Sutton (2011). There were seven statements (e.g. "Governments are suppressing evidence of the existence of aliens", *1= strongly disagree, 7= strongly agree*). The Belief in Real-World Conspiracy Theories Scale was adapted to measure the perceived beliefs of the in/out groups ("Now think about the group you previously stated that you feel close to and identify with. Please indicate how much you think the majority of [chosen in-group, or prescribed in-group or out-group] agree with each statement below").

Level of identification with each of the social groups (in-group, out-group and other university students) was measured using the Inclusion of Other in the Self scale (Aron, Aron, & Smollan, 1992; Tropp & Wright, 2001). This is a one-item scale where participants were presented with a series of seven Venn diagrams ranging from non-overlapping circles to almost fully over-lapping circles. Participants were asked to indicate which diagram best represents their level of identification with each group. The measure was scored on a scale ranging from one to seven, with one representing completely non over-lapping circles (i.e., very low identification) and seven representing nearly completely over-lapping circles (i.e., very high identification). Finally, Need for Uniqueness was measured using the four-item Self-

Attributed Need for Uniqueness (SANU) scale (Lynn & Snyder, 2002; e.g., “Being distinctive is important to me”, 1= *not at all*, 5= *extremely*). The measures were presented in a randomised order to each participant, followed by an online debrief.

2.2 Results and Discussion

Descriptive statistics and Pearson’s correlation coefficients are presented in Table 1. The effects of demographic variables on personal belief in conspiracy theories were tested. Sex differences were evident, with females having significantly higher belief in conspiracy theories (M = 3.38, SD = 1.35) than males (M = 2.51, SD = .97), $t(109) = -2.32$, $p = .022$, $d = 0.66$. There was no correlation between age and conspiracy belief ($r = -.01$, $p = .939$, $n = 111$).

As shown in Table 1, personal conspiracy belief significantly and positively correlated with the perceived beliefs of the in-group, ‘typical’ university students and also the out-group in conspiracy theories. Need for Uniqueness did not significantly correlate with any variables. Level of social identification with each social group did not significantly correlate with any variables, except for the level of social identification with ‘typical’ university students which significantly negatively correlated with age, thus older participants reported lower social identification with other university students.

A one-way repeated measures ANOVA was conducted between participants’ level of social identification with the in-group they chose, the out-group they chose and ‘typical’ university students. This was to check that participants have a higher level of social identification with the in-groups versus the out-group. As the assumption of sphericity was violated ($p = .027$), the Greenhouse-Geisser correction was used. There was a significant difference in level of social identification across

the three groups, $F(1.88, 204.74) = 253.83$, $p < .001$, $\eta_p^2 = .7$, $\eta_G^2 = .59$. Pairwise comparisons using Bonferroni corrections indicated that participants identified with their chosen in-group significantly more than the prescribed in-group ('typical' university students) ($p < .001$) and the out-group ($p < .001$), and they identified with 'typical' university students significantly more than with the out-group ($p < .001$) (See Table 1 for means). Thus, the three groups successfully represented a proximal in-group, a distal in-group and an out-group.

A hierarchal multiple regression analysis was then conducted to test the role of the perceived norms of conspiracy belief (the perceived belief of the in-group, 'typical' university students and the out-group) in predicting personal conspiracy beliefs. Personal conspiracy belief was entered as the dependent variable, with sex entered as the predictor variable in the first step of the regression. The model was significant, $F(1, 109) = 5.38$, $R^2 = .05$, $p = .022$, and accounted for 4.7% of variance in conspiracy belief. In the next step, the perceived conspiracy beliefs of the three groups were entered (see Table 2). The multi-collinearity of the model was checked, and no issues were detected (all tolerances >.59 and all VIFs <1.7). The overall regression model was significant, $F(4, 106) = 53.32$, $R^2 = .67$, $p < .001$, and accounted for 66.8% of the variance in personal conspiracy belief. As hypothesised, the perceived norms of conspiracy belief of the in-group positively predicted actual norms of conspiracy belief, as did the perceived norms of 'typical' university students. The perceived belief of the out-group in conspiracy theories did not significantly predict personal conspiracy belief.

Investigating the second hypothesis, a paired samples t-test was conducted to compare participants' actual conspiracy belief ($M = 3.27$, $SD = 1.34$) and their predictions of the belief of other students in conspiracy theories ($M = 3.66$, $SD =$

1.23) to assess for the presence of misperceptions of conspiracy belief norms. Participants estimated that others endorsed conspiracy beliefs significantly more than they personally did $t(110) = -3.83$, $p < .001$, Cohen's $d_z = 0.36$, demonstrating a self-other discrepancy.

Moderation analysis was conducted using the PROCESS macro for SPSS (Hayes, 2017). Model 2 was used which allows for two moderators to be added to the model (W and Z), and thus the effect of X (predictor), W, Z, XW, and XZ on Y (outcome) can be calculated. Model 2 was run twice, once for each of the significant predictors of belief in conspiracy theories; i) the perceived belief of the in-group (X) and ii) the perceived belief of 'typical' university students (X). Both participants' level of social identification with the group (W) and their Need for Uniqueness (Z) were added as moderator variables, whilst actual conspiracy beliefs was added as the dependent variable (Y). However, this analysis was non-significant for each of the predictor variables. The relationship between both the perceived belief of the in-group and the perceived belief of 'typical' university students in conspiracy theories and personal belief is not dependent on level of social identification with the group (in-group, $b = -.00$, $SE = .04$, $t(105) = -.12$, $p = .91$, 95% CI = -.07, .07; 'typical' university students, $b = .09$, $SE = .05$, $t(105) = 1.72$, $p = .09$, 95% CI = -.01, .19) or the need to feel unique (in-group, $b = .03$, $SE = .08$, $t(105) = .42$, $p = .67$, 95% CI = -.13, .19; 'typical' university students, $b = .11$, $SE = .11$, $t(105) = .98$, $p = .33$, 95% CI = -.11, .34).

Study 1 provides the first evidence that the perceived norms of conspiracy beliefs of groups identified with are positively associated with actual belief in conspiracy theories. The findings show that this relationship is not significantly moderated by the extent to which participants identify with the in-group (both chosen

and prescribed) or their need to feel unique. Moreover, this study demonstrates that conspiracy belief is perceived to be more normative amongst university students than it is.

3. Study 2

This study aimed to replicate the findings of Study 1 in a non-student, British community sample. The importance of this is to demonstrate the relationship between perceived norms of conspiratorial beliefs and personal beliefs outside of a university setting, as it has been noted that research assessing the influence of perceived norms on behaviours is often confined to university settings (McAlaney, Bewick, & Hughes, 2011). Therefore, the hypotheses and materials used in Study 2 mirrored those from Study 1; however, in this case, the prescribed in-group was 'Other British citizens'.

3.1 Method

3.1.1 Participants and Design

This study was pre-registered with the Open Science Framework (OSF) (osf.io/4786a).Two hundred and five participants were recruited via Prolific, an online recruitment platform where volunteers can register for studies in return for small monetary rewards (£1.25 for this study). Screening criteria were applied via Prolific to ensure that all participants were British and had a high approval rating on the recruitment platform, meaning that they had a reputation for completing surveys

satisfactorily[3]. Similar to Study 1, the questionnaire included attention check items (e.g. 'This statement is an attention check. Please select 4 for this statement') and participants who failed an attention check (*n* = 19) and participants who failed to enter a sensical in-group and out-group (*n* = 9) were removed. The remaining participants (*n* = 177; 129 females, 48 males, *M* = 35.66 years, *SD* = 12.27) were included in the analysis.

This study replicated the design of Study 1, where the outcome variable was participants' belief in conspiracy theories and the predictor variables were the perceived conspiracy beliefs of an in-group (chosen by participants), an out-group (chosen by participants) and 'other British citizens' (the prescribed in-group). Need for Uniqueness and level of social identification with each of the groups were measured as moderator variables. Demographic variables, age and sex, were measured.

3.1.2 Materials and Procedure

Ethical approval was first gained from the relevant university ethics panel. Qualtrics was used to design and host the study, and participants gave their informed consent before taking part. First participants were asked to complete the demographic questions and then they were asked to state an in-group and out-group of their choice. Participants then completed the same measures as in Study 1, presented in a randomised order, followed by an online debrief.

3.2 Results and Discussion

[3] The pre-registration stated that all participants would be British, however the approval rating criteria was not pre-registered.

Descriptive statistics and Pearson's correlation coefficients are presented in Table 3. The effects of demographic variables on the personal belief in conspiracy theories was tested. Unlike in Study 1, no sex differences were present (females: *M* = 2.74, *SD* = 1.38; males: *M* = 2.71, *SD* = 1.36, *t*(175) = -.153, *p* = .879, *d* = .03). There was no significant correlation between age and conspiracy belief (*r* = -.11, *p* = .132, *n* = 177), so they were not controlled for in the analysis. Mirroring the correlations found in Study 1, personal conspiracy belief was significantly positively correlated with the perceived belief of the participants' chosen in-group, the prescribed in-group (British citizens), and the out-group in conspiracy theories. Need for Uniqueness did not correlate significantly with any of the variables. There was a weak but significant negative correlation between the perceived belief of the out-group in conspiracy theories and level of social identification with the out-group; suggesting that the less the participants identified with the out-group, the higher their estimations that the out-group endorsed conspiracy theories.

A one-way repeated measures ANOVA was conducted between participants' level of social identification with the in-group they chose, the out-group they chose and 'Other British citizens', to check that participants had a higher level of social identification with the in-groups versus the out-group. The assumption of sphericity was violated (*p* = .003), thus the Greenhouse-Geisser correction was used. There was a significant difference in level of social identification across the three groups, *F*(1.88, 330.98) = 305.53, *p* < .001, η_p^2 = .63, η_G^2 = .51. Pairwise comparisons using Bonferroni adjustments indicated that the participants identified with their chosen in-group significantly more than the prescribed in-group ('Other British citizens') (*p* < .001) and the out-group (*p* < .001), and they identified with 'Other British citizens' significantly more than with the out-group (*p* < .001) (See Table 3 for means). This

confirmed that the groups selected successfully represented a proximal in-group, a distal in-group, and an out-group.

To test the first hypothesis, a multiple regression analysis was conducted. Personal conspiracy belief was entered as the dependent variable and the perceived conspiracy beliefs of the in-group, the 'other British citizens', and the perceived out-group were entered as predictor variables (see Table 4). The multi-collinearity of the model was checked, and no issues were detected (all tolerances > .55 and all VIFs < 1.8). The overall regression model was significant, $F(3, 173) = 108.75$, $R^2 = .65$, $p < .001$, and accounted for 65.3% of the variance in conspiracy belief. As hypothesised, and mirroring the findings of Study 1, the perceived belief of the in-group in conspiracy theories significantly positively predicted participants' personal belief in conspiracy theories and the perceived belief of the prescribed in-group, 'other British citizens', also significantly positively predicted conspiracy belief, but, as in Study 1, to a lesser extent. The perceived belief of the out-group did not significantly predict conspiracy belief.

A paired samples t-test was conducted to compare participants' actual conspiracy belief ($M = 2.73$, $SD = 1.37$) and their predictions of the belief of other British citizens ($M = 3.22$, $SD = 1.11$) to check for the presence of misperceptions of conspiracy belief amongst British citizens. Replicating the findings of Study 1, participants significantly over-estimated the conspiracy beliefs of others, $t(176) = -5.77$, $p < .001$, Cohen's $d_z = 0.43$.

Following the same procedure as Study 1, moderation analysis was conducted for each of the significant predictor variables; i) the perceived belief of the

in-group (see Figure 1)[4] and ii) the perceived belief of 'other British citizens' (see Figure 2). Need for Uniqueness did not moderate the relationship between perceived belief of either in-group in conspiracy theories (chosen in-group, b = .04, SE = .06, t(171) = .73, p = .47, 95% CI = -.07, .16; 'other British citizens', b = -.02, SE = .10, t(171) = -.18, p = .86, 95% CI = -.21, .18) and personal belief. Level of social identification with the group did, however, significantly moderate the relationship between both perceived belief of the chosen in-group and perceived belief of 'other British citizens' with actual conspiracy beliefs (chosen in-group, b = .07, SE = .03, t(171) = 2.14, p = .03, 95% CI = .01, .14; 'other British citizens', b = .13, SE = .05, t(171) = 2.80, p = .01, 95% CI = .04, .21). The higher the level of social identification with each in-group, the stronger the relationship between the perceived conspiratorial beliefs of that group and personal conspiracy beliefs. However, the relationship between the perceived beliefs of both in-groups and personal conspiracy beliefs was significant for each level of social identification with the in-group (see Figures 1 and 2).

Study 2 supports the findings from Study 1 demonstrating that perceived norms of an in-group's conspiracy beliefs are positively associated with personal conspiracy belief. Further, as predicted, this relationship is moderated by participants' level of social identification with the group for the general population sample in Study 2. Participants also overestimated the extent to which others endorse conspiracy theories, showing again that conspiracy belief is perceived to be more normative than it is.

4. Study 3

[4] The moderation graphs (Figures 1-3) were made with the help of the templates provided here: http://www.jeremydawson.co.uk/slopes.htm

This study aimed to replicate the findings of Studies 1 and 2, but in the context of a specific conspiracy theory: anti-vaccine conspiracy theories. By focusing on anti-vaccine conspiracy theories, we were also able to examine how different types of in-groups and out-groups can impact beliefs in conspiracy theories. How we categorise ourselves or others depends much on the current context; individuals have several group memberships which impact beliefs and behaviours at different times (Oakes, 1987). Both the salience of a group and how meaningful a group is to a particular context have been shown to maximise the influence of the in-group (Oakes, 1987; Simon & Hastedt, 1999). Thus, the current study investigates the influence of i) 'other parents' and ii) 'non-parents', on personal anti-vaccine conspiracy beliefs, representing an in-group and out-group more relevant to the context (i.e., people who have made a decision about vaccinating children). However, we also examined *others* more broadly that represent national in-groups and out-groups, specifically iii) other British citizens, and iv) North Macedonian citizens. North Macedonia was chosen as the out-group to represent a national group which participants were unlikely to share a group membership and are also unlikely to have much knowledge about North Macedonian related conspiracy theories. We predicted that the perceived belief of both in-groups, other parents and other British citizens, would significantly positively predict personal belief in anti-vaccine conspiracy theories, however this relationship would be stronger between the perceived belief of other parents and personal beliefs. It was predicted that the perceived beliefs of neither out-groups would be related to personal anti-vaccine conspiracy beliefs.

4.1 Method

4.1.1 Participants and Design

This study was pre-registered (osf.io/9q5kt). Participants were recruited using Prolific, in the same way as in Study 2. Screening criteria were applied via Prolific to ensure that all participants were British, were parents and had a high approval rating on the recruitment platform[5]. A sample of 200 participants was sought to increase the stability of correlations (Schönbrodt & Perugini, 2013). Thus, 217 British parents took part in the survey. Once data were cleaned, six respondents were removed as their surveys were incomplete and 14 respondents were removed as they failed to accurately complete an attention check (e.g. 'Check '4' for this statement'). A sample of 197 British parents was included in the analysis (135 females, 61 males, 1 trans/other M_{age} = 42.42 years, SD_{age}= 11.09).

The design of the study was cross-sectional, where the outcome variable was the participants' belief in anti-vaccine conspiracy theories. The predictor variables were the perceived beliefs of the *Majority of Other Parents* (an in-group anticipated to be salient and meaningful in this context), the *Majority of Non-parents* (an out-group anticipated to be meaningful in this context), the *Majority of Other British Citizens* and the *Majority of North Macedonian Citizens*. Participants' Need for Uniqueness and social identification with each of the groups were measured as moderator variables. Participants' demographic characteristics (sex, age), and age of their youngest child were measured. Education level was also specifically measured as research has indicated that this can negatively predict conspiracy beliefs (e.g. van Prooijen, 2017).

4.1.2 Materials and procedure

[5] The pre-registration form stated that all participants would be British parents, however the approval rating criteria was not pre-registered.

Ethical approval was first gained from the relevant university ethics panel and the study was hosted by Qualtrics. Once the study was accessed via Prolific, participants were first presented with an information page, followed by a consent form. First participants were asked to complete the demographic questions. Need for Uniqueness was measured in the same way as in Studies 1 and 2 (SANU scale; Lynn & Snyder, 2002).

Personal belief in anti-vaccine conspiracy theories was measured using the Belief in Anti-Vaccine Conspiracy Theories Scale, adapted from Jolley and Douglas (2014b). There were 10 statements for participants to complete (e.g. "Misrepresentation of the efficacy of childhood vaccines is motivated by profit", 1 = strongly disagree, 7 = strongly agree). Participants completed this scale a further four times, where it was adapted to measure the perceived beliefs of the in/out-groups; *Majority of Other Parents*, *Majority of Non-parents*, *Majority of Other British Citizens* and *Majority of North Macedonian Citizens.* Level of social identification with each of the social groups was measured in the same way as in Studies 1 and 2, using the Inclusion of Other in the Self Scale (Aron, Aron, & Smollan, 1992; Tropp & Wright, 2001). The measures were presented in a randomised order to each participant, followed by an online debrief.

4.3 Results and Discussion

Descriptive statistics and Pearson's correlation coefficients are presented in Table 5. The effects of demographic variables on personal belief in anti-vaccine conspiracy theories were tested. Sex differences were evident, with male participants having significantly higher belief in anti-vaccine conspiracy theories (M = 3.00, SD = 1.42) than females (M = 2.56, SD = 1.14), z (196) = -2.02, p = .044. Education level was also significantly negatively associated with anti-vaccine

conspiracy beliefs, r = -.23, p = .001, n = 197; participants who had a higher level of education had a lower belief in anti-vaccine conspiracy theories. The age of the participants' youngest child was also significantly associated with their anti-vaccine conspiracy beliefs, r = .17, p = .015, n = 197, such that participants with older children had a stronger belief in anti-vaccine conspiracy theories. Thus, participants' sex, education level, and their children's age were controlled for in the regression analyses. There was no correlation between the participants' age and their anti-vaccine conspiracy belief (r = .12, p = .092, n = 197).

As shown in Table 5, personal anti-vaccine conspiracy belief was significantly positively correlated with the perceived belief of each of the groups. This indicates that the perceived beliefs of others in anti-vaccine conspiracy theories are significantly positively correlated with personal beliefs in anti-vaccine conspiracy theories, demonstrating the same pattern as general conspiracy theories shown in Studies 1 and 2. Need for Uniqueness was also significantly positively correlated with personal belief in anti-vaccine conspiracy theories.

The level of identification with the in-groups (other parents and other British citizens) and out-groups (non-parents and North Macedonian citizens) were compared to ensure that participants identified more with the in-groups than the out-groups. A one-way repeated measures ANOVA was conducted between participants' level of social identification with other parents, non-parents, British citizens, and North Macedonian citizens. The assumption of sphericity was violated (p < .001), thus the Greenhouse-Geisser correction was used. There was a significant difference in identification across the four groups; F(2.48, 486.85) = 130.775, p < .001, η_p^2 = .4, η_G^2 = *.24* . Bonferroni analysis indicated that participants

identified significantly more with other parents (M = 4.76, SD = 1.73) than with non-parents (M = 3.39, SD = 1.73), $p < .001$. Likewise, participants identified significantly more with other British citizens (M = 4.43, SD = 1.78) than with North Macedonian citizens (M = 2.23, SD = 1.77), $p < .001$. Participants also identified with other parents significantly more than they identified with other British citizens, $p = .009$

A hierarchal multiple regression analysis was conducted to test the first hypothesis, that the perceived beliefs of other parents and other British citizens in anti-vaccine conspiracy theories positively predicts personal belief. Personal anti-vaccine conspiracy belief was entered as the dependent variable. Then, sex, the age of participants' youngest child and participants' education level were entered as the predictor variables in the first step. The initial model was significant, $F(3, 192) = 6.56$, $R^2 = .093$, $p < .001$, and accounted for 9.3% of variance in participants' anti-vaccine conspiracy beliefs. In the next step, the perceived anti-vaccine conspiracy beliefs of the four groups were entered as predictor variables. The multi-collinearity of the model was checked, and no issues were detected (all tolerances > 0.47 and all VIFs < 2.12). The overall regression model was significant, $F(7, 188) = 46.40$, $R^2 = .63$, $p < .001$, and accounted for 63% of the variance in personal belief in anti-vaccine conspiracy theories (see Table 6).

As hypothesised, the perceived beliefs of other parents in anti-vaccine conspiracy beliefs significantly positively predicted personal belief in anti-vaccine conspiracy theories. The perceived belief of those who were not parents did not significantly predict personal belief. Also, as predicted, the perceived belief of other British citizens predicted personal belief in anti-vaccine conspiracy theories, but to a lesser extent than the perceived belief of other parents. This supports our predictions that other parents are a meaningful in-group regarding anti-vaccine conspiracy

theories, where the perceived beliefs of this group are strongly positively associated with personal beliefs. The perceived belief of North Macedonian citizens also significantly predicted personal belief in anti-vaccine conspiracy theories.

Moderation analysis was then conducted to test whether the relationship between the perceived belief of other parents in anti-vaccine conspiracy theories and personal belief was stronger for participants who highly identified with other parents, and/or participants who had a higher need to feel unique. Moderation analysis was conducted in the same way as Studies 1 and 2. Potential moderators, which were (1) participants' Need for Uniqueness and (2) their level of social identification with other parents were added and all significant predictors in the hierarchical multiple regression above were included as covariates. The overall model was significant $F(10,185) = 38.56$, $R^2 = .68$, $p < .001$, meaning that the new model predicted 68% of the variance in participants' anti-vaccine conspiracy beliefs. Table 6 shows that both interaction terms were significant, along with significant main effects of the perceived beliefs of other parents, the perceived belief of the out-group (North Macedonian Citizens), education level and Need for Uniqueness. The addition of the interaction terms to the model significantly increased the variance in personal endorsement of anti-vaccine conspiracy theories explained, $F(2,185) = 7.33$, $\Delta R^2 = .03$, $p = .001$. However, this effect is small, with the addition of the interaction terms explaining only an extra 3% of the variance (see Figure 3).

Investigating the second hypothesis, that participants over-estimate the extent to which other parents endorse anti-vaccine conspiracy theories, a one-way repeated measures ANOVA was conducted. The assumption of sphericity was violated and thus the Greenhouse-Geisser correction was used ($p = .046$). There was a significant difference between perceived belief of others in anti-vaccine

conspiracy theories and actual belief, $F(1.94, 380.1) = 20.84$, $p < .001$, $\eta_p^2 = .1$, $\eta_G^2 = .02$ .Bonferroni analysis indicated that participants significantly over-estimated the belief of both other parents ($p < .001$) and other British citizens ($p < .001$) in anti-vaccine conspiracy theories.

Perceived norms of anti-vaccine conspiracy beliefs of other parents is significantly positively associated with the actual anti-vaccine conspiracy beliefs of parents. The relationship between the perceived belief of other parents in anti-vaccine conspiracy theories and personal belief is moderated by the extent to which participants identify with other parents, and participants' need to feel unique; both heightened identification and need to feel unique strengthened this relationship. This study also demonstrated a self-other discrepancy, where parents estimated that other parents' belief in anti-vaccine conspiracy theories was higher than their own. Thus, across the three studies, the perceived belief of in-groups in conspiracy theories has been shown to be significantly, positively associated with personal beliefs.

5. General Discussion

5.1 The Present Findings

The current research supports the hypothesis that there is a positive relationship between perceived norms of in-group conspiracy belief and personal belief in conspiracy theories. This effect was found across both a student and community sample (when looking at general conspiracy belief) and in a parent sample (when focussing on anti-vaccine conspiracy beliefs). This is the first evidence of the relationship between the perceived norms of in-group conspiracy beliefs and personal conspiracy belief, where this relationship holds true for both the in-group chosen by participants, an in-group related to the context (other parents) and, to a

lesser extent, a more generic in-group (students, British Citizens). These studies strongly demonstrate that if people perceive that those with whom they share a group membership with endorse conspiracy theories, then they themselves will be more likely to endorse conspiracy theories. The analysis did not yield a significant association between the perceived belief of out-groups in conspiracy theories and personal belief.

Further, in Studies 1 and 2 the relationship between perceived in-group belief and personal conspiracy belief was not influenced by participants' need to feel unique although in Study 3, contrary to predictions, participants' Need for Uniqueness slightly strengthened this relationship. These findings are important, as previous research shows that a stronger need to feel unique can buffer against social influence pressures (Imhoff & Erb, 2009). However, in Studies 1 and 2, a stronger Need for Uniqueness didn't impact the association with social influence and in Study 3, Need for Uniqueness actually strengthened the effect of social influence. This may be because Need for Uniqueness has been shown to positively predict conspiracy belief (Imhoff & Lamberty, 2017; Lantian et al, 2017) and thus in Study 3, heightened Need for Uniqueness positively predicted personal anti-vaccine conspiracy belief and the perceived belief of other British Citizens.

The next moderator tested was the level of identification with the in-group. Indeed, Social Identity Theory (SIT) stresses the importance of using the group as a guide for personal beliefs and behaviours (Tajfel & Turner, 1979; Turner, 1982; 1991) and that this is accentuated when one more strongly identifies with the group (Terry & Hogg, 1996). Thus, it was predicted that the relationship between perceived norms of the in-group regarding conspiracy belief and personal conspiracy belief would be strengthened for those who strongly identified with the in-group. In Studies

2 and 3, level of social identification with the group was a moderator, such that, the more participants identified with the in-group, the stronger the relationship between the perceived norms of that group and personal conspiracy belief, consistent with our hypothesis. However, this relationship was not signficant in Study 1. This could be because, in Study 1, the participants' student identity was already salient (Hogg & Turner, 1987), as they were completing the study in exchange for course credits, and thus they saw themselves as a 'student' meaning they were influenced by the norms of this group without necessarily documenting higher identification with this group. It is also worth noting that even in Studies 2 and 3, the relationship between perceived beliefs of the in-groups and personal conspiracy beliefs was strong at each level of social identification with the group. Thus, the perceived belief of the in-group in conspiracy theories is still associated with personal belief even for those who don't necessarily strongly identify with the in-group.

The originality of the findings from the three studies presented here is demonstrated firstly in their contribution to our knowledge of the antecedents of conspiracy belief. Previous research has demonstrated that personality factors, such as narcissism, Machiavellianism, and subclinical paranoid and schizotypal personality traits (Barron et al., 2018; Darwin et al., 2011; Douglas & Sutton, 2011; March & Springer, 2019;), and psychological processes, such as distrust in authority, higher political cynicism, and lower self-esteem (see Douglas, Sutton & Cichocka, 2017 for a review) are predictive of conspiracy belief. Similarly, Chayinska and Minescu (2018) and Mashuri and Zaduquisti (2014) have demonstrated that there are social identity mechanisms at play within intergroup conspiracy theories. In an intergroup context with situational threat, a greater level of social identification with an in-group can influence endorsement of specific conspiracy theories targeted

against the out-group. However, strong identification with the in-group does not always increase endorsement of conspiracy theories. Previous research has shown that defensive in-group identification, specifically, collective narcissism (and not secure identification with the in-group), is predictive of conspiracy beliefs against the out-group (Cichocka et al., 2015; Cichocka et al., 2015; Marchlewska, et al., 2019). The current studies uniquely extend our knowledge of the role of social influence mechanisms in conspiracy belief, demonstrating that the perceived norms of in-groups' conspiracy beliefs are strongly associated with general conspiracy theory endorsement in both a student and British community sample and with specific, harmful conspiracy theories. And further, that strong identification with the in-group can amplify this relationship.

The findings also uniquely reveal that people have misperceptions about other people's belief in conspiracy theories, estimating that others endorse them more than they do. Conspiracy theories are alternative viewpoints, which go against more mainstream accounts (Goertzel, 1994) and are generally considered a minority viewpoint (Lantian et al., 2017). However, conspiracy theories are gaining traction via the internet (Howell, 2013), specifically social media, and are often reported in mainstream news (e.g. Jolley & Patterson, 2020; Smith & Novella, 2007). The current findings suggest that belief in conspiracy theories and belief in anti-vaccine conspiracy theories specifically are considered to be more normative than they actually are. This is important because if the conspiracy belief of in-groups is over-estimated, this could elicit unwarranted social pressure to also endorse conspiracy beliefs. Considering the negative social and health consequences of harbouring conspiracy beliefs (Jolley & Douglas, 2014a; Jolley & Douglas 2014b; Jolley et al.,

2019, Thorburn & Bogart, 2005), specifically anti-vaccine conspiracy theories, it is concerning that perceived social norms could be driving conspiracy belief.

Studies 1 and 2 did not support previous findings with regards to the relationship between Need for Uniqueness and belief in conspiracy theories (Imhoff & Lamberty, 2017; Lantian et al, 2017). Previous research has demonstrated that conspiracy belief is positively predicted by one's need to feel unique, however, no such relationship was found in Studies 1 or 2. This could be indicative of cultural differences with regards to Need for Uniqueness in the UK compared to other European countries and the US where this relationship has previously been evidenced (Imhoff & Lamberty, 2017; Lantian et al, 2017). Further research could explore these potential cultural nuances in the relationship between Need for Uniqueness and Conspiracy belief.

4.2 Limitations and Future Research

One limitation of the current research is that it is correlational, where we have identified a relationship between the perceived conspiracy belief of others identified with and personal belief in conspiracy theories, but the causal direction is not yet established. As social norms provide an expectation about appropriate social behaviour (Sherif, 1936; Cialdini & Trost, 1998), and as such, have continually been shown influence personal attitudes and behaviour (Asch, 1954; Cialdini, Kallgren & Reno, 1991; Sherif, 1936), it is plausible that perceived social norms of conspiracy beliefs influence personal belief in conspiracy theories. For example, previous research has shown that perceived social norms can predict a wide range of behaviours; college student drinking (e.g. Bosari & Carey, 2001); smoking (e.g. Piscke et al., 2015); eating habits (e.g. Lally et al., 2010; Perkins et al., 2010, 2018),

gambling (e.g. Larimer & Neighbors, 2003; Meisel & Goodie, 2014) and sun protection (e.g Reid & Aiken, 2013). Thus, the current research extends this notion demonstrating the association between perceived social norms of in-group conspiracy belief and personal beliefs.

Social norms perceptions can also have a reciprocal relationship with behaviour. Perceived social norms could influence personal attitudes and behaviours, and/or personal attitudes and behaviours can be projected onto others to estimate social norms (i.e., social projection). Future research should consider employing longitudinal and/or experimental designs to unpick the cause and effect relationship between social norms perceptions and personal beliefs in conspiracy theories. However, given the potential dangers of endorsing conspiracy theories demonstrated in the literature (see Douglas, Sutton, Jolley & Wood, 2015) an experimental manipulation aiming to increase belief in them could be harmful. On the one hand, it could be argued that a reciprocal relationship between perceived social norms of conspiracy beliefs and personal beliefs could reinforce one another such that; research has demonstrated that social projection plays an important role in shaping social norm perceptions and the subsequent acceptance of these perceived social norms reinforces the continuation of that belief or behaviour (Cho, Chung & Filippova, 2015; Neighbors et al., 2006). In the context of college student alcohol consumption, the effect of perceived norms on behaviour appears to be greater than the effect of personal behaviours on perceived norms (Neighbors et al., 2006). Moreover, the relationship between perceived norms of in-group conspiracy beliefs and personal beliefs was found across three different samples which indicates that the relationship is robust.

A second limitation of this research is that participants self-reported their level of conspiratorial belief using 'The Belief in Real-World Conspiracy Theory Scale' (Douglas & Sutton, 2011) in Studies 1 and 2, and the Belief in Anti-Vaccine Conspiracy Theories Scale, adapted from Jolley and Douglas (2014b) in Study 3, and as such, how participants infer the scales is not clear-cut. These scales have been used previously in conspiracy theory research and have shown good reliability (Douglas, Sutton, Callan, Dawtry, & Harvey, 2016; Jolley & Douglas, 2014b; 2017). Although, some research has shown that endorsing conspiracy theories can be viewed as a source of social stigma and thus participants may be less willing to divulge their conspiracy beliefs (Lantian, Muller, Nurra, Klein, Berjot & Pantazi, 2018), this potential limitation was minimised as the survey was completed online meaning participants disclosed their beliefs privately.

The key findings of this research support the proposition that interventions challenging misperceived norms could be effective in reducing conspiracy beliefs in the future, which has not been attempted before. The current studies have provided evidence for the two key tenants of the Social Norms Approach (SNA; Dempsey, McAlaney & Bewick, 2018; McAlaney et al., 2011). The SNA begins with the premise that individuals are influenced by the beliefs and behaviours of others and often make misperceptions about how much others engage in certain behaviours. These misperceptions influence personal engagement in that behaviour (Perkins & Berkowitz, 1986). The SNA works by challenging these misperceptions of the belief and behaviours of others and thus reducing the social pressure to engage in a problem behaviour (Dempsey et al., 2018). Often used to reduce excessive drinking amongst college students (LaBrie et al., 2008; Neighbors et al., 2004; Walters et al., 2000), this approach is now gaining traction in other areas, for

example, promoting energy conservation (Anderson et al., 2017) and reducing problematic gambling behaviours (Larimer & Neighbors, 2003). This could potentially be extended to reduce harmful conspiracy beliefs as the current study has demonstrated that i) there is a relationship between perceived conspiracy beliefs of others identified with and personal conspiracy beliefs and ii) participants over-estimate the extent to which others endorse conspiracy beliefs.

This is important, as research to date suggests that conspiracy beliefs are associated with potentially harmful consequences, for example, anti-vaccine conspiracy beliefs can directly reduce intentions to vaccinate (Jolley & Douglas, 2014b). Jolley and Douglas (2017) have addressed anti-vaccine conspiracy using an inoculation technique. They demonstrated that exposure to anti-conspiracy arguments prior to exposure to anti-vaccine conspiracy theories could inoculate people against the potentially harmful effects of anti-vaccine conspiracy theories. However, this intervention was not successful when the anti-conspiracy arguments were presented after the anti-vaccine conspiracy theories; demonstrating that once these beliefs are established, they can be difficult to correct, limiting the success of this approach (Jolley & Douglas, 2017). Therefore, these findings provide the foundations for developing interventions like the SNA, challenging misperceived norms and providing new avenues to reduce conspiracy beliefs in the future.

Conclusion

In summary, across three studies, the current research demonstrates that the perceived belief of in-groups in conspiracy theories are strongly, positively associated with personal conspiracy belief. Further, the current research shows that people over-estimate the extent of conspiracy belief amongst their in-groups. This is

important as it is the first study to directly link the perceived norms of in-groups to personal conspiracy belief and demonstrate that conspiracy beliefs of others are over-estimated. A challenge for researchers now is to determine the utility of information-based interventions which challenge such normative misperceptions of conspiracy belief as a means of reducing the negative outcomes of conspiracy belief.

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Table 1

Means, standard deviations, Cronbach's alpha, and Pearson correlation matrix (Study 1).

	Mean	*SD*	α	1	2	3	4	5	6	7	8	9
1. Personal conspiracy belief	3.27	1.34	.82		.78**	.66**	.22*	-.04	-.01	-.10	.08	-.01
2. Perceived belief of in-group in CT	3.27	1.43	.88			.56**	.15	-.03	.04	-.06	.09	-.05
3.Perceived belief of 'Typical' students in CT	3.66	1.23	.86				.30**	-.03	.13	-.05	-.01	-.04
4. Perceived belief of out-group in CT	3.76	1.58	.89					.03	.11	-.16	-.02	-.09
5. Need for uniqueness	2.65	0.77	.78						-.14	.08	.11	-.01
6. Age (years)	23.32	7.81	-							.02	-.20*	-.02
7. In-group identification	5.30	1.54	-								.11	.03
8. 'Typical' student identification	3.75	1.42	-									.13
9. Out-group identification	1.48	0.92	-									

n= 111. **p*<.05. ***p*<.01.

Table 2

Results of the hierarchical multiple regression model predicting personal conspiracy belief (Study 1).

Step	Predictor	B	SE B	β	*t*	CI (95%)
1	Sex	.87	.38	.22	2.32*	.13, 1.62
2	Sex	-.12	.24	-.03	-0.52	-.60, .35
	Perceived belief of in-group in CT	.57	.07	.61	8.36**	.44, .71
	Perceived belief of 'Typical' students in CT	.31	.08	.29	4.99**	.16, .47
	Perceived belief of out-group in CT	.04	.05	.05	0.77	-.06, .14

*p<.05. **p<.01.

Table 3

Means, standard deviations, Cronbach's alpha, and Pearson correlation matrix (Study 2).

	Mean	*SD*	α	1	2	3	4	5	6	7	8	9
1.Personal conspiracy theory (CT) belief	2.73	1.37	.85		.79**	.60**	.26**	.09	-.11	-.01	.07	.01
2. Perceived belief of in-group in CT	2.87	1.29	.87			.60**	.22**	.11	-.12	-.10	.08	.03
3.Perceived belief of 'Typical' British citizens in CT	3.22	1.11	.84				.42**	.02	-.09	-.01	-.12	-.10
4. Perceived belief of out-group in CT	3.49	1.44	.88					.04	-.04	.01	.00	-.16*
5. Need for uniqueness	2.56	0.81	.88						-.11	.00	-.12	-.08
6. Age (years)	35.66	12.27	-							-.03	.04	-.01
7. In-group identification	5.18	1.48	-								.35**	-.20**
8. 'Typical' British citizen identification	3.79	1.50	-									.09
9. Out-group identification	1.69	1.22	-									

n = 177 *$p < .05$, ** $p < .01$.

Table 4

Results of the multiple regression model predicting personal conspiracy belief (Study 2).

Predictor	B	SE B	β	*t*	CI (95%)
Perceived belief of in-group in CT	.72	.06	.68	12.14**	.61, .84
Perceived belief of 'Typical' British citizens in CT	.21	.07	.17	2.87**	.07, .36
Perceived belief of out-group in CT	.03	.05	.03	0.66	-.06, .12

** $p < .01$.

Table 5

Means, standard deviations, Cronbach's alpha, and Pearson correlation matrix (Study 3).

	Mean	***SD***	**α**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. *Personal* anti-vaccine CT belief	2.69	1.24	.93		.74**	.44**	.62**	.46**	.24**	.12	-.23**	-.02	-.03	-.07	.15*
2. Perceived belief of *other parents* in anti-vaccine CTs	3.07	1.22	.93			.45**	.67**	.35**	.14	.19**	-.16*	-.11	-.06	-.05	.07
3.Perceived belief of *non-parents* in anti-vaccine CTs	3.07	1.28	.94				.51**	.36**	.19**	.20**	-.09	-.05	-.10	-.14*	.01
4. Perceived belief of *other British citizens* in anti-vaccine CTs	3.08	1.12	.92					.42**	.20**	.08	-.18*	-.11	-.12	-.13	.03
5. Perceived belief of *North Macedonian citizens* in anti-vaccine CTs	3.50	1.16	.93						.10	-.01	-.06	.02	-.07	.03	.06
6. Need for uniqueness	2.41	0.86	.88							-.08	.14*	.02	.01	-.17*	.03
7. Age (years)			-								-.14*	-.03	.08	.04	-.06
8. Education												.07	.08	-.01	.05
9. Identification with parents	4.76	1.73	-										.43**	.65**	.11

10. Identification with non-parents	3.39	1.73	-					.46**	.33**
11. Identification with British citizens	4.43	1.78	-						.18*
12. Identification with North Macedonian citizens	2.23	1.77	-						

N = 197. *p < .05. **p < .01

Table 6 Results of the hierarchical multiple regression model predicting personal belief in anti-vaccine conspiracy theories.

Step	Predictor	B	SE B	β	*t*	CI (95%)
1	Sex	-.43	.18	-.16	-2.36*	-.79, -.07
	Education level	-.17	.06	-.20	-2.78**	-.29, -.05
	Age of youngest child	.01	.01	.12	1.66	-.00, .03
2	Sex	-.25	.12	-.09	-2.09*	-.4.8, -.01
	Education level	-.08	.04	-.10	-2.03*	-.16, -.00
	Age of youngest child	.00	.01	.03	0.60	-.01, .01
	Perceived belief of other parents in anti-vaccine CTs	.54	.06	.53	8.67**	.42, .67
	Perceived belief of non-parents in anti-vaccine CTs	.03	.05	.04	0.65	-.07, .14
	Perceived belief of other British citizens in anti-vaccine CTs	.16	.07	.15	2.27*	.02, .30
	Perceived belief of North Macedonian citizens in anti-vaccine CTs	.21	.05	.20	3.99**	.11, .32

*p<.05. **p<.01.

Table 7

Moderation analysis predicting personal belief in anti-vaccine conspiracy theories.

Predictor	**B**	**SE B**	***t***	**CI (95%)**
Sex	-.14	.12	-1.24	-.37, .08
Education level	-.12	.04	-3.14**	-.20, -.05
Age of youngest child	.01	.01	1.18	-.00, .02
Perceived belief of Other British citizens in anti-vaccine CTs	.12	.07	1.86	-.01, .26
Perceived belief of North Macedonian citizens in anti-vaccine CTs	.22	.05	2.49**	.12, .32
Perceived belief of other parents in anti-vaccine CTs	.55	.06	9.30**	.43, .67
Need for uniqueness	.16	.07	2.39*	.03, .29
Social identification with other parents	.04	.03	1.16	-.03, .10
Perceived belief of other parents in anti-vaccine CTs * Need for uniqueness	.14	.05	2.96**	.05, .24

Perceived belief of other parents in anti-vaccine CTs * Social identification with other parents	.05	.02	2.11*	.00, .10

*p<.05. **p<.01.

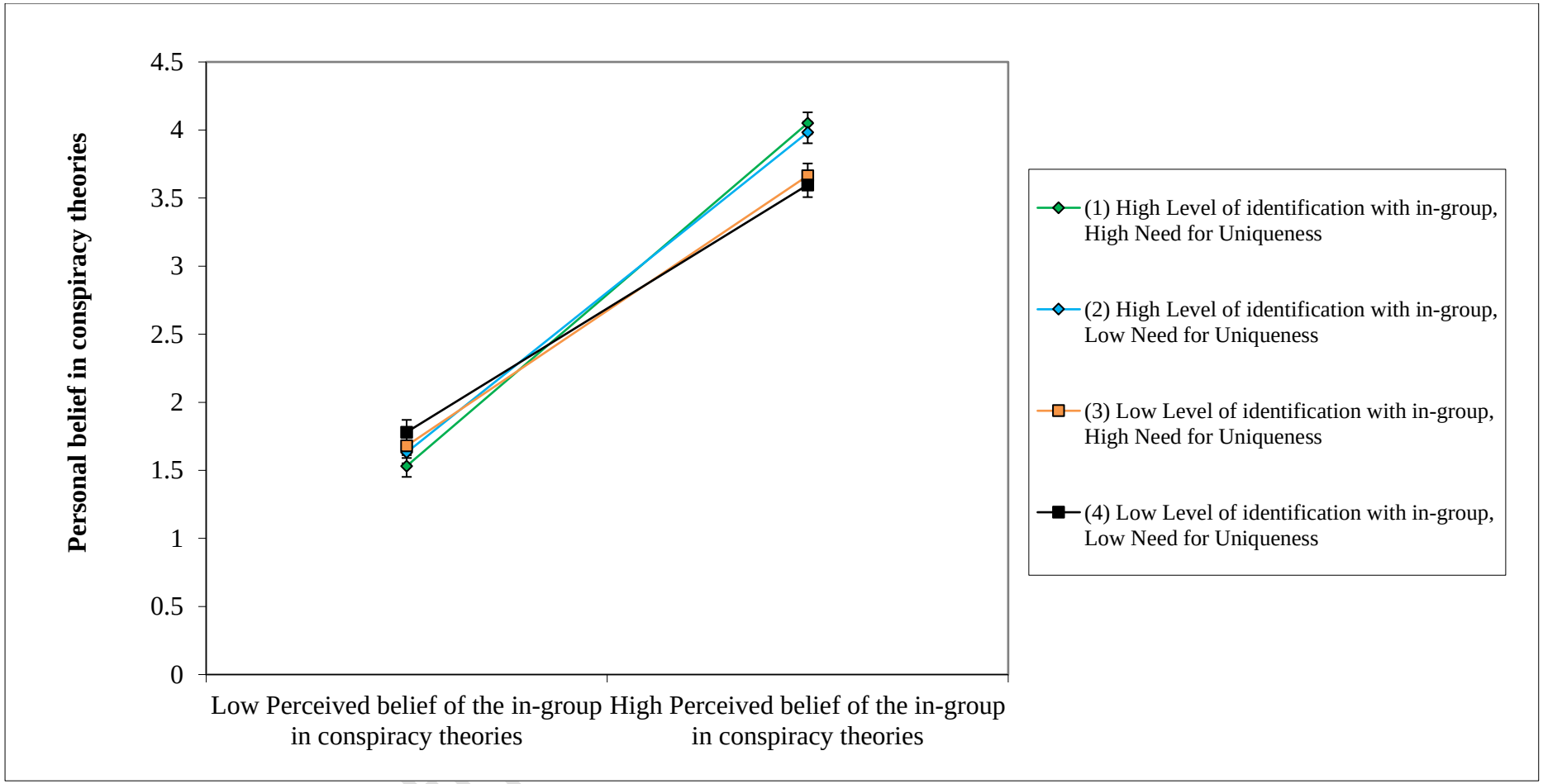

Figure 1. Moderation effect of level of identification with the in-group on the positive association of perceived belief of the in-group in conspiracy theories and personal belief in conspiracy theories in Study 2 (Model 2 of PROCESS macro; N = 177). Error bars display the standard error.

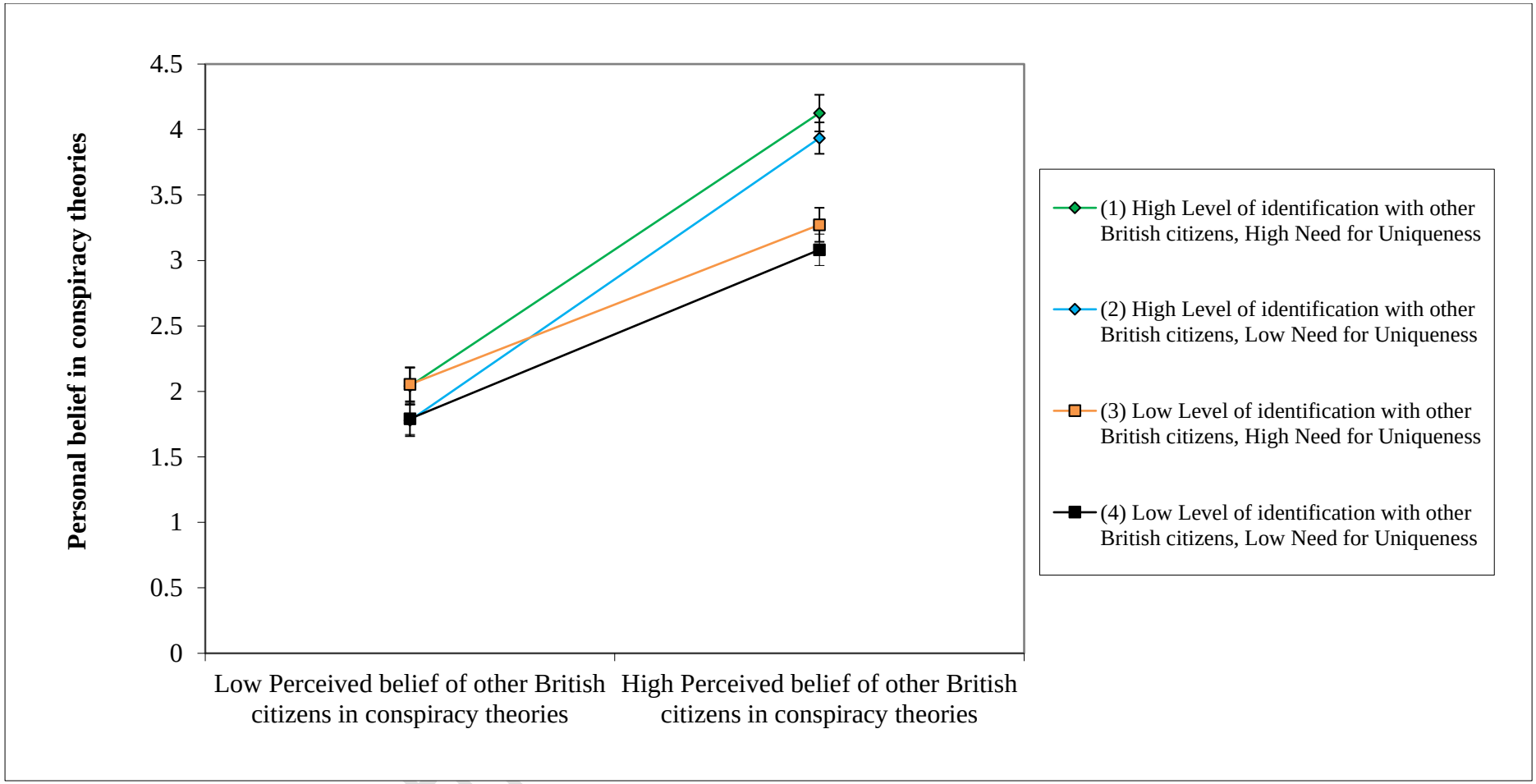

Figure 2. Moderation effect of level of identification with other British citizens on the positive association of perceived belief of other British citizens in conspiracy theories and personal belief in conspiracy theories in Study 2 (Model 2 of PROCESS macro; $N = 177$). Error bars display the standard error.

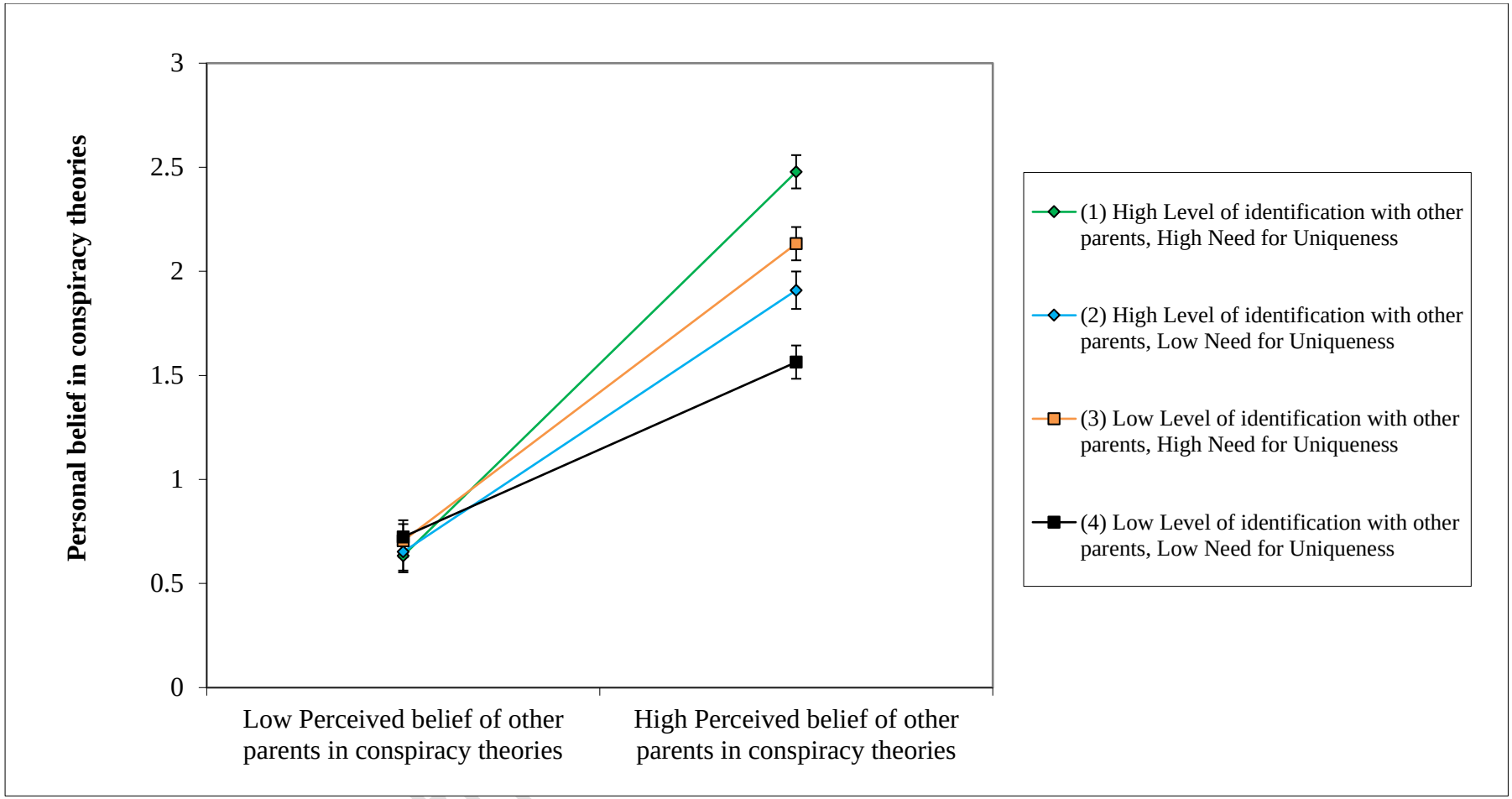

Figure 3. Moderation effect of level of identification with other parents and Need for Uniqueness on the positive association of perceived belief of other parents in anti-vaccine conspiracy theories and personal belief in anti-vaccine conspiracy theories in Study 3 (Model 2 of PROCESS macro; N = 197). Error bars display the standard error.